



May 21, 2008

Mr. Jeet Radia
Vice President
McWane Inc.
1143 Vanderbilt Road
Birmingham, AL 35234

Subject: Response to USEPA Comments on BACT Determination
Clow Water Systems Company – Coshocton, OH

Dear Mr. Radia:

This letter provides responses to USEPA, Region 5 comments concerning the BACT Determination prepared by RMT, Inc. (RMT) for Clow Water Systems Company (Clow). A response follows each of the USEPA comments.

USEPA Comment

1. Chapter B.III.A. Identify all Control Technologies. - The control alternatives should include not only existing controls for the source category in question, but also (through technology transfer) controls applied to similar source categories and gas streams, and innovative control technologies.

In Clow's BACT analysis, the company did not include the Ring Jet Scrubber as an optional control technology as required by USEPA. The BACT Determination should be revised to include the Ring Jet Scrubber as a control technology.

Response

As discussed in Attachment 1, Ring Jet Scrubber technology was not identified in the USEPA Foundry Information Collection Request (ICR) database, in the RBLC database, or known within or even outside of the metal casting industry as an "available" air emission control technology. The technology became known to McWane coincidentally through Clow's then Environmental Manager who was previously employed at VonRoll America where the Ring Jet technology was developed for internal use on hazardous waste incinerators. It is important to note the Ring Jet Scrubber technology is not identified in the RBLC or in the Ohio EPA BAT database for any VonRoll emissions unit.

Specifically regarding the transfer of the Ring Jet Scrubber technology from a hazardous waste incinerator to a cupola, there are key differences that would make successful application less than certain. For example, the cupola's higher temperatures make it more likely that the heavy metal particulate will be vaporized and then condense. A combustion derived particulate or particulate formed from condensation is generally much smaller than one simply driven off during an incineration process.

USEPA Comment

2. Chapter B.IV.D.2. Cost/Economic Impacts Analysis – Where a control technology has been successfully applied to similar sources in a source category, an applicant should concentrate on documenting significant cost differences, if any, between the application of the control technology on those other sources and the particular source under review.

The installation and use of a baghouse on a cupola has been successfully applied at many foundries in the United States. Clow did not document significant or any cost differences between the installation and operating of a baghouse at Clow versus that at any of the foundries that have done so successfully. Clow should revise its BACT Determination to include this information.

Based on information in USEPA's RACT/BACT/LAER Clearinghouse, 14/16 of the foundries have installed baghouses. The ones that had wet scrubbers were installed over twenty years ago (1981) or were much smaller facilities. See attached spreadsheet of data pulled from the RACT/BACT/LAER Clearinghouse of foundries which have conducted PSD/NSR review for PM on a cupola.

Response

As discussed in Attachment 1, please note the following in relation to the RBLC information provided by USEPA:

- The Ford Motor Company entry is not for a cupola but for a desulfurization unit. Ford has venturi wet scrubbers installed on their four cupolas.
- Sparta Manufacturing is closed. Whether the cupola was a new installation or modification is unknown.
- Fritz Enterprises is a recycler and not an iron foundry.
- Neenah Foundry is not in the RBLC and no information is known regarding the entry.

- Of the remaining foundries with cupolas in the database, there are 10 baghouse installations. Of the 10 baghouse installations, seven are new cupola installations and the other three are modifications to existing cupolas. Of the three existing cupolas with baghouses, all are major sources of hazardous air pollutants and therefore must install a baghouses to meet the applicable Foundry MACT PM emissions limit of 0.006 gr/dscf.
- Only the cupolas at the closed Sparta facility and Fritz Enterprise's facility were known to have demonstrated compliance with their emissions limitations.

The above indicates that none of the entries in the RBLC are representative of Clow's situation where an existing cupola with a wet scrubber was modified and underwent a BACT analysis showing that replacing the existing wet scrubber with a baghouse was economically feasible.

USEPA Comment

3. Chapter B.IV.D.2.a. Estimating the Costs of Control – Before costs can be estimated, the control system design parameters must be specified....In general, the BACT analysis should present vendor-supplied parameters. Potential sources of other data on design parameters are BID documents used to support NSPS development, control technique guidelines documents, cost manuals developed by EPA, or control data in trade publications....The basis for equipment cost estimates also should be documented, either with data supplied by an equipment vendor (*i.e.*, budget estimates or bids) or by a referenced source (such as the OAQPS Control Cost Manual)....Costs should also be site specific.

The USEPA Background Information document for the NESHAP for Iron foundries, December 18, 2002 (EPA-453/R-02-013) (BID) lists cost information for foundries to install a baghouse (Section 6.2.1). Based on Table 6.1 in the BID, the approximate cost for a foundry of this size to install a baghouse is approximately:

Total capital cost: \$2 million

Baghouse annual capital costs: \$180k

Baghouse annual operating costs: \$300k

A retrofit cost factor of 2 was applied to the total capital investment cost estimate to capture the costs of removing existing control equipment and of dealing with other difficulties anticipated with a system retrofit of this nature.

The numbers provided in the BID vary dramatically from those Clow provided in its BACT analysis. Clow's total annual capital cost estimate in their analysis was \$5,754,500 based on a generic quote from Modern Equipment Company.

According to the BID, wet scrubber annual operating costs are approximately \$420k.

Based on the modern casting article that Clow provided in the BACT analysis, the total difference in operating costs between a wet scrubber and a baghouse is \$1.31/ton of iron melted, which based on 275,000 tons is \$360,250 (which is the number that Clow provided in their BACT analysis). Also, the total difference in operating costs between a wet scrubber and a baghouse that Clow provided in the BACT analysis was based on data that is about 10 years old. Clow should provide this information in today's dollars.

Clow should revise its BACT Determination to include vendor-supplied cost estimates for a baghouse specific to its facility. Clow should also include the increased costs for wastewater treatment that are associated with the wet scrubber in its analysis.

Response

A vendor quote for a baghouse system installed at another McWane foundry (Atlantic States Cast Iron Pipe) is included in Attachment 1 that yields the design parameters for a cupola only slightly smaller than the Clow cupola. As shown by the provided vendor quote and costs for other cupola baghouse installations throughout the industry, the use of equations 6.1 and 6.2 vastly understates the costs associated with installing a baghouse on a cupola. There is insufficient data in the BID to identify the original source of the data on which the equations were based or to determine the cause of the underestimation resulting from use of the equations.

USEPA Comment

4. Chapter B.IV.D.2.b Cost Effectiveness – Average cost effectiveness (total annualized costs of control divided by annual emission reductions, or the difference between the baseline emission rate and the controlled emission rate) is a way to present the costs of control. The baseline emissions rate represents a realistic scenario of upper boundary uncontrolled emissions for the source. The NSPS/NESHAP requirements or the application of controls, including other controls necessary to comply with State or local air pollution regulations, are not considered in calculating the baseline emissions.

When calculating their cost effectiveness for a baghouse, Clow did not use its baseline emissions. Clow used only their current controlled emission rate. Clow needs to use the following formula to determine cost/ton:

*Average cost Effectiveness (dollars per ton removed) =
Control option annualized cost / (Baseline emissions rate - Control option emissions rate)
Costs are calculated in (annualized) dollars per year (\$/yr) and emissions rates are calculated in tons per year (tons/yr). The result is a cost effectiveness number in (annualized) dollars per ton (\$/ton) of pollutant removed.*

Response

As detailed Attachment 1, the method in the original BACT to determine baseline emissions for the cost-effectiveness demonstration is supported by both the New Source Review Workshop Manual and the Advanced New Source Review Manual as provided by Gary McCutchen and RTP Environmental.

Below are some of the pertinent citations:

- NSR Workshop Manual, p B. 39, 2nd full paragraph states "...permit conditions are normally used to make operating assumptions enforceable; the use of "standard industry practice" parameters for cost effectiveness calculations (but not applicability determinations) can be acceptable without permit conditions. However, when a source projects operating parameters (e.g., limited hours of operation or capacity utilization, type of fuel, raw materials or product mix or type) that are lower than standard industry practice or which have a deciding role in the BACT determination, then these parameters or assumptions must be made enforceable with permit conditions. If the applicant will not accept enforceable conditions, then the reviewing agency should use the worst case uncontrolled emissions in calculating baseline emissions. This is necessary to ensure the permit reflects the conditions under which the source intends to operate."
- NSR Workshop Manual, p. B.40, 1st partial paragraph, states "...it is important that the applicant confirm that the operational assumptions used to define the source's baseline emissions (and BACT) are genuine. As previously mentioned, this is usually done through enforceable permit conditions which reflect limits on the source's operation which were used to calculate baseline emissions."
- NSR Workshop Manual, p. 4.40, 1st full paragraph states "...certain cases, such explicit permit conditions may not be necessary. For example, a source for which continuous operations would be a physical impossibility (by virtue of its design) may consider this limitation in estimating baseline emissions, without a direct permit limit on operations."
- Advanced NSR Manual, p. 70, when determining baseline for cost effectiveness calculations the "EAB confirmed use of water injection as the baseline, since it was an "integral component" of a simple cycle gas turbine peaking power plant".

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The use of the current venturi wet scrubber in determining baseline emissions is appropriate and more stringent than above as the use of the venturi scrubber is a federally enforceable permit condition required by the facility's Title V operating permit.

Regarding the comment in the Advanced NSR Manual, a venturi scrubber installed on a cupola is as much an integral component as water injection installed on a gas turbine. Both PM control measures may be installed either during or subsequent to installation for the purpose of controlling air emissions.

USEPA Comment

5. Chapter B.IV.D.3 Environmental Impact Analysis – The environmental impacts portion of the BACT analysis concentrates on impacts other than impacts on air quality (*i.e.*, ambient concentrations) due to emissions of the regulated pollutant in question, such as solid or hazardous waste generation, discharges of polluted water from a control device, visibility impacts, or emissions of unregulated pollutants....The applicant should identify any significant or unusual environmental impacts associated with a control alternative that have the potential to affect the selection or elimination of a control alternative.

Clow did not consider the energy, environmental and economic impacts of the available and technically feasible control technology options in its BACT analysis. In particular, there is no mention that a baghouse would reduce the quantity of fine particles that find their way into the storm water, the amount of solids in the water treated at the wastewater treatment plant (WWTP), and the amount of sludge generated by the WWTP. In addition, there is no discussion of the hazardous waste streams that may be eliminated if a baghouse were installed.

Clow should revise its BACT Determination to include this information.

Response

There are no significant or unusual environmental impacts identified that would have the potential to affect the selection or elimination of a control alternative. Nevertheless, to respond to USEPA's comments a discussion of impacts are provided in the Attachment 1. Important points to consider include:

- Clow has a system and plan in place to effectively manage the storm water that may come in contact with any airborne particulates that settle on-site.
- While the wet scrubber generates a liquid stream that would not be evident when using a baghouse, all water is captured and reused on-site.
- No hazardous waste is generated from either air pollution control alternative.

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Please contact me should you have any questions regarding the above.

Sincerely,



Craig S. Schmeisser
Project Manager

Attachment

cc: Central Files

Attachment 1

Summary

In May 2002 a BACT determination was submitted for particulate matter, particulate matter less than 10 microns, and volatile organic compounds for the possible modification to the cupola at Clow Water Systems Company (Clow), a ductile iron pipe foundry, located in Coshocton, Ohio.

Pertinent key findings related to the control of particulate matter (PM) included the following:

- The PM and PM₁₀ emissions from the cupola are currently controlled to relatively low mass emissions rates by a wet scrubber.
- From review of the RBLC, Ohio EPA's BAT database and the EPA Information Collection Request (EPA, 1998) to support development of the National Emission Standards for Hazardous Air Pollutant (NESHAP) for Iron and Steel Foundries (Foundry ICR), cupola particulate matter emissions are controlled by a wet scrubber or baghouse. The annualized cost per ton to install a baghouse in lieu of the wet scrubber exceeds \$10,000 per ton.

Following submittal of the BACT, and discussions with Ohio EPA, Clow agreed to a BACT determination that would limit PM emissions from the cupola to 0.207 pounds (lbs) per ton of metal melted (or 28.46 tons per year of PM).

This document responds to USEPA's April 2008 comments concerning the BACT analysis.

Technology Review

A review of the RACT/BACT/LAER Clearinghouse (RBLC) was completed in 2001 and early 2002 during preparation of the air permit application and the results are included in Table 1.1. As stated in the original submittal, reviews of historical and transient databases were not completed because the control determinations in those databases would be over ten years old and would not likely represent current technology.

In addition to the RBLC, applications in the Ohio Environmental Protection Agency (Ohio EPA) BAT database containing similar operations are included in Table 1.2.

Emission rates in pounds of particulate matter per ton of melt ranged from 0.078 to 0.340 in the RBLC and from 0.260 to 0.810 in the Ohio EPA BAT database.

Of the entries in the RBLC and Ohio EPA BAT database during application preparation, the recently constructed Waupaca Tell City, Indiana plant employs baghouses with the Waupaca facility in Waupaca, WI, the OSCO facility in Portsmouth, OH and the GMC facility in Defiance, OH all employing wet scrubbers control PM emissions.

The BACT PM emissions limitation of 0.207 lbs of PM per ton of metal agreed upon by Clow and Ohio EPA is less than any cupola employing a wet scrubber in either the RBLC or the Ohio EPA BAT.

Table 1.1
PM/PM₁₀ RBLC Data

FACILITY	PERMIT NO. (date issued)	OPERATION DESCRIPTION	EMISSIONS LIMITS/CONTROL REQUIREMENTS (equivalent rate per ton processed)
Waupaca Foundry – Plant 5 (Tell City, IN)	CPP 123- 4593 (5/31/96)	Iron Foundry Cupola (60 tph)	0.078 lb PM/ton 0.010 gr/dscf
Waupaca Foundry , Inc. (Tell City, IN)	123-8451 (2/01/99)	Cupola Existing (80 tph) and Cupola, Phase II (80 tph)	0.078 lb PM/ton 0.010 gr/dscf
Waupaca Foundry Inc., Plant 1 (Waupaca, WI)	91-RV-103 (12/01/92)	Cupola (with Hot Blast Burners, Afterburner)	0.340 lbs. PM/ton 0.064 gr/dscf

Table 1.2
PM/PM₁₀ Ohio BAT Data

FACILITY	PERMIT NO. (date issued)	OPERATION DESCRIPTION	BAT DESCRIPTION
OSCO Industries Inc. (Portsmouth, OH)	0-7380 (NK)	Iron Melting Cupolas	0.812 lbs. PM/ton
GMC Powertrain Division (Defiance, OH)	03-7076 (1988)	60 tph Plasma Arc Cupola	0.26 lb/ton 0.03 gr/dscf

Historically, the majority of cupola particulate matter emissions have been controlled by wet scrubbers. Table 1.3 summarizes the PM emission control devices as provided in the Foundry ICR.

Table 1.3
Cupola Control Technology Identified in EPA's Foundry ICR

Control Technology	Number of Furnaces
Wet Scrubber	71
Baghouse	55
Electrostatic Precipitator	1
None	9
Total	143

Technology Transfer

Reviewing the USEPA developed electronic database that includes responses from the Foundry ICR shows that venturi scrubbers are the most common type of wet scrubber installed on cupolas. The database shows that all wet scrubbers are of venturi design excluding one (1) "vertical packed", eight (8) "other" and one (1) where no information type was selected. Descriptions in the "other" field include "wet cap", "mesh mist eliminators" and "water sprays in ductwork". Ring Jet technology was not identified as a cupola emission control device in any category in the EPA Foundry ICR.

In addition to the above, the Ring Jet technology was not identified in the RBLC database. Industry knowledge indicates that prior to the Clow installation, Ring Jet technology was not used to control particulate matter from a foundry cupola. The technology became known to McWane coincidentally through Clow's then Environmental Manager, who was previously employed at VonRoll America where the Ring Jet technology was developed for internal use on hazardous waste incinerators.

With regard to technology transfer, while particulate emissions from an incinerator and from a cupola originate primarily from the feed material (hazardous waste and scrap metal/coke respectively), that basically ends the similarity. First, an incinerator such as VonRoll America's incinerator is burning industrial hazardous waste (both liquids and solids). The waste contains heavy metals - volatile, semi-volatile, and low-volatility and the incinerator typically operates at 1800 F. The cupola is combusting natural gas and coke for the purpose of melting scrap metal at significantly higher temperatures than 1800 F. The higher the temperature the more likely that the heavy metal particulate will be vaporized and then condense. A combustion derived particulate or particulate formed from condensation is generally much smaller than one simply driven off the process (ash in the hazardous waste or from the scrap metal). Therefore, the particulates from the cupola is of a different composition and most likely much smaller than that from the incinerator. While the basics are the same, there are far too many differences, because of the completely different processes and design variables to expect a simple transfer of the Ring Jet technology from the incinerator to the cupola.

Environmental Impacts Analysis

There are no significant or unusual environmental impacts identified that would have the potential to affect the selection or elimination of a control alternative. Nevertheless, to respond to USEPA's comments, a discussion of impacts to consider include:

Storm Water – For particulates that remain on-site and become subject to storm water, Clow has a system and plan in place to effectively manage the storm water that may come in contact with any airborne particulates that settle on-site.

Wet Scrubber Effluent – While the wet scrubber generates a liquid stream that would not be evident when using a baghouse, all water is captured and reused on-site.

Solid Waste – Because of greater control efficiency of a baghouse there would be more dry solids compared to the wet scrubber. But due to the water content of the filter cake, the wet scrubber would increase the amount of material that must be disposed.

Hazardous Waste – No hazardous waste is generated from either air pollution control alternatives (baghouse or wet scrubber).

Energy Usage – Because of the processing requirements associated with the scrubber effluent, there will be additional energy usage associated with pumps and mixers located at the waste water treatment plant. The scrubber system energy consumption would also be higher than that for a baghouse.

Economic Evaluation

The following presents additional information concerning the economic evaluation of the cupola air pollution control device alternatives.

Evaluation of Current RBLC Information

Table 1.4 presents a summary of RBLC entries for the installation or modification of iron foundry cupolas that was provided by USEPA for the period January 1, 1970 through April 3, 2008. RMT has modified the table by adding an additional comment field and whether compliance with the PM emissions limitations had been demonstrated.

Items to consider regarding Table 1.4 include:

- The Ford Motor Company entry is not for a cupola but for a desulfurization unit. Ford has venturi wet scrubbers installed on their four cupolas.
- Sparta Manufacturing is closed. Whether the cupola was a new installation or modification is unknown.
- Fritz Enterprises is a recycler and not an iron foundry. Fritz installed a new cupola.
- Neenah Foundry is not in the RBLC and no information is known regarding the entry.

- Of the remaining foundries with cupolas in the database, there are 10 baghouse installations. Of the 10 baghouse installations, seven are new cupola installations and the other three are modifications to existing cupolas. Of the three existing cupolas with baghouses, all are major sources of hazardous air pollutants and therefore must install a baghouses to meet the applicable Foundry MACT PM emissions limit of 0.006 gr/dscf.
- Only the cupolas at the closed Sparta facility and Fritz Enterprise's facility were known to have demonstrated compliance with their emissions limitations.

The above indicates that none of the entries in the RBLC are representative of Clow's situation where an existing cupola with a wet scrubber was modified and underwent a BACT analysis showing that replacing the existing wet scrubber with a baghouse was economically feasible.

Foundry MACT BID Document

The USEPA Background Information Document for the NESHAP for Iron and Steel Foundries (EPA-453/R-02-013) provide total capital cost and annual operating costs for foundries to install a baghouse for cupola emissions control. The costs are represented by equations 6.1 and 6.2.

A vendor quote for a baghouse system installed at another McWane foundry (Atlantic States Cast Iron Pipe) is included in Appendix A that yields the design parameters for a cupola only slightly smaller than the Clow cupola. As shown by the provided vendor quote and costs for other cupola baghouse installations throughout the industry, the use of equations 6.1 and 6.2 vastly understates the costs associated with installing a baghouse on a cupola. There is insufficient data in the BID to identify the original source of the data on which the equations were based or to determine the cause of the underestimation resulting from use of the equations. During recent discussions with USEPA concerning the Foundry Area Source rule, USEPA was asked for data to support both the total capital costs and annual operating costs for the installation of a baghouse on an electric induction furnace (equations 6.10 and 6.11). USEPA stated the program used to develop the costs that resulted in the equations is no longer supported.

Cost-effectiveness Evaluation

During development of the original BACT document, the capital cost to convert from a wet scrubber to a fabric filter was obtained from a vendor with substantial cupola experience.

In the initial BACT submittal, the average cost effectiveness was determined by the following equation:

$$\text{Average Cost Effectiveness (\$/ton removed)} = \frac{\text{Baseline Annualized Control Option Annualized Cost} - \text{Current Annualized Cost (\$/yr)}}{\text{Difference in Emissions Rates for the Baseline and the Baghouse}}$$

The baseline emissions were determined as the actual emission rate of the cupola with the baseline annual cost being equal to the difference in the operating costs between the wet scrubber and the baghouse.

This method is substantiated in both the New Source Review Workshop Manual and the Advanced New Source Review Manual as provided by Gary McCutchen and RTP Environmental.

The New Source Review Workshop manual provides the basis in the following places:

a) 2nd paragraph, p B. 39 states "...permit conditions are normally used to make operating assumptions enforceable; the use of "standard industry practice" parameters for cost effectiveness calculations (but not applicability determinations) can be acceptable without permit conditions. However, when a source projects operating parameters (e.g., limited hours of operation or capacity utilization, type of fuel, raw materials or product mix or type) that are lower than standard industry practice or which have a deciding role in the BACT determination, then these parameters or assumptions must be made enforceable with permit conditions. If the application will not accept enforceable conditions, then the reviewing agency should use the worst case uncontrolled emissions in calculating baseline emissions. This is necessary to ensure the permit reflects the conditions under which the source intends to operate."

The use of the current venturi wet scrubber in determining baseline emissions is appropriate and more stringent than above as the use of the venturi scrubber is required by the facility's Title V operating permit.

b) 1st partial paragraph, p. B.40 states "...it is important that the applicant confirm that the operational assumptions used to define the source's baseline emissions (and BACT) are genuine. As previously mentioned, this is usually done through enforceable permit conditions which reflect limits on the source's operation which were used to calculate baseline emissions."

As stated above, the facility has already accepted federally enforceable permit conditions within their Title V operating permit.

c) 1st full paragraph, p. 4.40 states "...certain cases, such explicitly permit conditions may not be necessary. For example, a source for which continuous operations would be a physical impossibility (by virtue of its design) may consider this limitation in estimating baseline emissions, without a direct permit limit on operations."

A direct permit limit has already been included in the facility's Title V operating permit to operate the venturi scrubber.

The Advanced New Source Review Manual provides the following support:

a) On p. 70, when determining baseline for cost effectiveness calculations the "EAB confirmed use of water injection as the baseline, since it was an "integral component" of a simple cycle gas turbine peaking power plant".

Regarding the comment in the Advanced NSR Manual, a venturi scrubber installed on a cupola is as much an integral component as water injection installed on a gas turbine. Both PM control measures may be installed either during or subsequent to installation for the purpose of controlling air emissions.

For this submittal a proposal (included in Appendix A) to replace the existing wet scrubber with a baghouse at a Clow sister facility (Atlantic States Cast Iron Pipe Company) was used for cost-effectiveness purposes. Using the proposal, revised cost-effectiveness was determined to exceed \$20,000 per ton of PM controlled. The cost-effectiveness is included in Appendix B.